IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

T. Kawaguchi Group art Unit: 1771

Serial No.: 09/522,489 Examiner: Ruddock, U.

Filed: March 10, 2000

For: Cathode-Ray Tube Implosion-Proof Adhesive Mesh Tape And Uses Thereof

DECLARATION UNDER 37 C.F.R. §1.132

Honorable Commissioner of Patents and Trademarks,
Washington, D.C. 20231

Sir:

I, Hidemoto Fukuzawa, a citizen of Japan, residing at c/o Teraoka Seisakusho Co., Ltd., 4-22, 1-Chome, Hiro-machi, Shinagawa-ku, Tokyo, Japan, hereby declare the following.

1. I am a co-inventor of the above-identified patent application.

2. I graduated from Tokyo university of Science, Faculty of Science, Chemistry in 1985. I worked for Soken Chemical & Engineering CO., Ltd. from 1985 to 1991, where I was engaged in research and development of acrylic adhesive

design. In 1991, I was employed by Teraoka Seisakusyo Co. Ltd. and, since then up to the present, I have belonged to the Research & Development Division, Technical Research & Design Department, where I have worked on research and development of insulation tape, shield tape, double-sided adhesive tape, masking tape and cathode-ray tube implosion-proof tape.

3. In the Office Action dated November 19, 2002, claims 1 and 3 - 9 of this application were rejected under U.S.C. 103(3) as being unpatentable over Kawaguchi et al. (US 5478639).

In the Office Action, it was stated as follows: Kawaguchi et al. discloses the claimed invention except that the total volume of the hot melt resin and pressure sensitive adhesive is less than the volume of the open space of the fabric and more specifically that the pressure sensitive adhesive is not more then three fourths or half of the volume of the open space of the fabric'. It would have been obvious to one having ordinary skilled in the art to have made the total volume of the hot melt resin and pressure sensitive adhesive be less than the volume of the open space of the fabric and more than specifically that the pressure sensitive adhesive be more than three fourths or half of the volume of the open space of the fabric motivated by the desire to

obtain a tape that uses less adhesive resulting in cheaper manufacturing costs and having a higher bonding strength. Figures 7 - 9 in Kawaguchi et al. define open spaces between the yarns.

4. I conducted experiments to show that a mesh tape of the present invention is not only a reduction of the adhesive amount from the conventional cathode-ray tube implosion-proof tape or Kawaguchi (USP'639)'s tape.

First, I note that in USP'639, Figures 7 - 9 does not define open spaces between the yarns. As shown in Fig. 6, a cross-section of the cathode-ray tube implosion-proof tape of USP'639, the backing of a union cloth 21 is completely sandwiched by or immersed in adhesive layers 22 and 23. On the other hand, Figures 7 - 9 show only the weaves of the union cloth (see the Brief Description of the Drawings and explanation of Figs. 7 - 9) of natural or synthetic yarns as the warps and glass filament yarns as at least part of the wefts, which is the characteristic featur of USP'639 (see the abstract and claims). Thus, Figures 7 - 9 do not define open spaces.

The invention of USP'639 was made by Kawaguchi et al. who is also the inventor of the present invention. Therefore, we know very well that the tape of USP'639

comprises continuous adh sive layers between which a union cloth is sandwiched. In the conventional cathode-ray tube implosion-proof tape, it was the basic idea that the continuous adhesive layers are the main elements of the tape and the backing is an additional element to the continuous adhesive layers to assist the function of the cathode-ray tube implosion-proof tape, and therefore discontinuous adhesive layers were not considered. Even in dip coating mentioned in USP'639, the adhesive layers were considered to be continuous.

5. We conducted experiments in which the thickness of the adhesive layer(s) in the cathode-ray tube implosion-proof tape as disclosed in USP'639 was varied from a normal one to a reduced one using a union cloth backing as used in USP'639 and the properties of the tapes were evaluated. The results can be compared with the result of mesh tapes in accordance with the present invention. The tapes were prepared as described below:

Backing:

A union cloth of a glass fiber and a rayon yarn with a density of 13 glass fibers per 25 mm and 13 rayon yarns per 25 mm was used in run nos. 1 - 9.

Tape formation:

A mesh baking:

An aqueous polyester resin with a melting point of 116°C (hot melt adhesive) was used as an adhesive and was impregnated in a mesh backing (union cloth), followed by drying at 100°C for 5 minutes.

A pressure-sensitive adhesive used was prepared by kneading a natural rubber to a plasticity of Wales 24, adding it with a C5-base petroleum resin at 1:1 and dissolving it in toluene. The obtained solution was coated on the elements of the mesh backing while care was taken to maintain spaces in the mesh and dried at 100°C for 3 minutes.

A laminated tape:

An adhesive of LDPE (low density polyethylene) with a softening point of 110°C was heated to 310°C and extruded to form a laminate on a mesh backing. The same pressure-sensitive adhesive as used for the above mesh tape was used and dried under the same conditions as above.

Evaluation method:

An adhesive force:

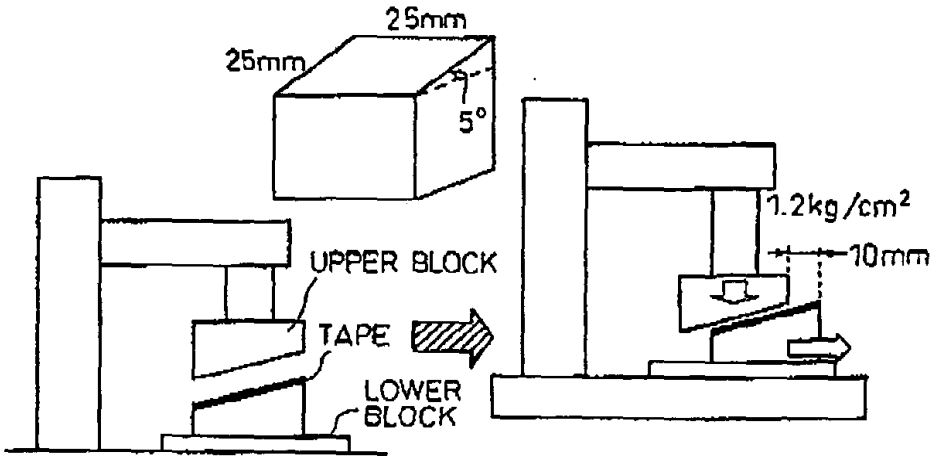
A 180° peeling strength from a stainless steel plate was measured at a peeling speed of 300 mm/min.

A taper block test:

This test was conducted using procedure similar to that as described in page 10 of U.S. patent No. 5,246,771.

The taper block test is a simulation test for the slip that could occur when a metal band with a cathode-ray tube implosion-proof tape is applied to around a cathode tube.

As shown below, a pair of blocks with an angle of 5° and a contact area of 25 mm × 25 mm are used and a sample tape (25 mm × 25 mm) is applied on the contact surface of a lower block, an upper block is place on the lower block, a pressure of 1.2 kg/cm^2 and a heat of 300°C are applied thereto, and the time until the lower block slips or is moved for a 10 mm distance is measured.



run	type	amount of adhesive (g/m^2)	amount of pressure-sensitive adhesive (g/m^2)	thickness (mm)	adhesive force (N/10 mm)	taper block test result
1	mesh	20	63	0.47	0.9	1428s/10.0 mm
2	mesh	20	70	0.48	1.3	1600s/10.0 mm
3	laminate	55	145	0.31	1.7	32s/10.0 mm
4	laminate	60	90	0.41	0.4	14s/10.0 mm
5	laminate	30	90	0.4	0.4	11s/10.0 mm
6	laminate	15	90	0.39	0.2	20s/10.0 mm
7	laminate	60	40	0.42	0.81	38s/10.0 mm
8	laminate	30	40	0.36	0.08	31s/10.0 mm
9	laminate	15	40	0.36	0.07	11s/10.0 mm

Note) Run 3 is a conventional tape

As described in the present application, the present invention was created to solve the slip problem which occurs when a cathode-ray tube became a flat front type. The above test corresponds to a severe condition that occurs when a clamping band is applied to a flat front type cathode-ray tube.

In the above table, runs 1 and 2 correspond to the present invention (mesh tape) and in runs 3 - 9 were used continuous tapes (laminate tape) as in USP'639. Run 3 was a conventional one (commercial one for non-flat type cathode tube). In runs 4 to 9, the amounts of the adhesive and pressure-sensitive adhesive were reduced in comparison with run 3.

As seen from the table, a conventional tape did not pass the above taper block test, since it took only 32 seconds

until 10.0 mm of slip occurred. In contrast, the tapes of runs 1 and 2 passed the taper block test, since it took a longer time, i.e. more than 1000 seconds, for 10.0 mm of slip to occur. In runs 3 - 9, when the amounts of the adhesive and pressure-sensitive adhesive were reduced from normal to equal to or less than the level of the mesh tape of the present invention, the slip characteristic was not substantially improved, while the adhesive force was significantly reduced. Therefore, it is clearly shown in th experiments that if, in the conventional cathode-ray tube implosion-proof tape, the amounts of the adhesive (hot melt type) and pressure-sensitive adhesive are reduced in order to reduce the manufacturing cost of the tape, the adhesive force is disadvantageously reduced, while the slip characteristic is not improved. In connection with this, it should be noted that the adhesive force between the clamping band and the cathode-ray tube provided by the adhesive tape is the primarily important characteristic.

Therefore, at the time of USP'639 or before the present invention, a person skilled in the art would not have considered reducing the amounts of the adhesive (hot melt type) and pressure-sensitive adhesive in a cathode-ray tube implosion-proof tape. Further, even if the amounts of the adhesive (hot melt type) and pressure-sensitive adhesive in a cathode-ray tube implosion-proof tape is reduced, the object

of the present invention is not attained.

Thus, the disclosure of the present invention was surprising; i.e. it was discovered by the present inventors that not by reducing the amounts of the adhesive (hot melt type) and pressure-sensitive adhesive, but by changing the cathode-ray tube implosion-proof tape from a laminate type (continuous type) to a mesh type, i.e., by providing spaces between yarns of a mesh backing, the slip characteristic of the tape can be significantly improved while the adhesive force is not substantially reduced. While it is not impossible, a mesh tape is not simply obtained by reducing the amounts of adhesives. Special care should be taken to provide spaces between yarns of a mesh tape when adhesives are applied to a mesh backing. Thus, a mesh tape can be produced only by an intentional approach. Reduction of the cost of a tape by reducing the amounts of the adhesives is merely a side effect in the present invention. The most important and critical effect of the present invention resides in significant improvement in slip characteristic provided by changing the tape from a laminate-type tape to a mesh-type tape.

USP'630 does not teach or suggest the cathode-ray tube implosion-proof mesh tape and its advantages as disclosed in the present invention.

I, the undersigned declarant, declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and; further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001, of Title 18, of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 18th day of July , 2003

Hidemoto Fukuzawa

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